PATENT SPECIFICATION

1,025,398

DRAWINGS ATTACHED

1,025,398

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Int. Cl.:—F 06 d

COMPLETE SPECIFICATION

Improvements in Automatic Slack Adjusters for Vehicle Brake Linkages

We, SVENSKA AKTIEBOLAGET BROMSREGULATOR, of Adelgatan 5, Malmö C, Sweden, a Swedish body corporate, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an automatic slack adjuster for a vehicle brake linkage, the slack adjuster being of the kind comprising a lever mounted for angular movement about an axis, the said lever being connectable to brake-operating means so as to be actuated thereby for rotation about the said axis, a worm gear mounted in the said lever for angular adjustment about said axis and being connectable to brake-actuating means in such a manner as to operate same in response to rotation of said lever about said axis, the said lever furthermore housing a worm meshing with said worm gear so as to be capable of rotation to adjust the angular position of the worm gear relative to the said lever for adjusting the slack in the linkage, the said worm being rotatable by motion transmitted through a transmission system including a one-way coupling from worm-driving means oscillating in response to angular movements of the said lever about said axis beyond a predetermined angular departure from the neutral position of the lever.

An automatic slack adjuster of the kind referred to is particularly suitable for air or vacuum operated brakes on heavy road vehicles.

The type of braking system in which adjusters of the kind referred to are applicable is commonly used in heavy road vehicles and comprises the said lever and the said shaft, and the latter usually carries a cam which upon rotation of the said shaft urges the brake shoes against the inner cylindrical face of the brake drum against the action of return springs.

Various proposals have been made for constructing a slack adjuster of the kind referred to with means for automatically adjusting the slack by causing the said worm to be rotated when the slack has become excessive.

In these known slack adjusters, adjustment is effected whenever the angular motion of the said lever upon braking exceeds a predetermined limit, this being taken as an indication that the slack has become excessive.

However, the fact is that in the operation of braking systems of the type described, the total angular movement of the said lever during braking (or during brake release) is composed of an angular movement during which the braking shoes are not in contact with the braking drum, and another angular movement during which such contact exists. The first angular movement depends on the play between the brake shoes and the brake drum in the completely released state of the brake, while the other angular movement depends on the braking force and the elasticity of the braking system.

Therefore, if the total angular movement of the said lever becomes excessive, the reason for this may be either that the play between the braking shoes and the braking drum in the completely released state of the brake is excessive, or that the elastic deformation during a braking operation has been excessive due to an excessive braking force. It is therefore a disadvantage of the known adjusters of the kind referred to that adjustment may take place as a consequence of a single very hard application of the brakes in circumstances in which no adjustment is really required, and as a result the slack may become too small.

engages both these surfaces. The windings of the one-way coupling spring 42 are such that the gear wheel 41 can transmit a rotary movement to the clutch sleeve 37 only in the direction causing a decrease of the slack in the brake linkage.

The gear wheel 41 is engaged by a toothed rack 43, of which the lower part forms an abutment 44 for the lower end of a compression spring 45 having its upper end engaging an abutment surface in the lever 3.

The toothed rack 43 is provided with another tooth row engaging a toothed part of a ring 46 which is journalled in the lever 3 coaxially with the worm wheel 4. A guiding sleeve 47 is journalled in the ring 46 and is rigidly connected to a stationary part 49 of the vehicle by an arm 48. The guiding sleeve 47 and the ring 46 are rotatably connected to each other by a key 50 rigidly connected to the ring 46 and protruding into a groove 51 in the sleeve 47, the said groove 51 being wider than the key 50.

In Figures 6 and 7 is shown a cover 52 which is omitted from Figure 5 for the sake of clarity.

The adjuster shown in Figs. 5, 6 and 7 will function as follows.

During the application of the brake the lever 3 is turned in the direction shown by the arrow (Fig. 5) on the lever 3. The sleeve 47 is stationary, and, after the lost motion between the key 50 and the adjacent wall of the groove 51 in the counter-clockwise direction has been exhausted, the ring 46 is also stationary. During the further turning of the lever 3 the toothed rack 43 is displaced relative to the lever 3 in such a direction that the spring 45 will be compressed. During this displacement of the rack 43 the gear wheel 41 will be turned but the spring 42 has such windings that it cannot transmit any torque in this direction and thus the clutch sleeve 37 will remain stationary.

The force between the worm wheel 4 and the worm 6 will increase as the braking force increases. As soon as the compression spring 35 is not able to retain the shaft 7 in the axial position shown, the said shaft 7 will be moved towards the right as viewed in Figs. 5 and 6 until the worm 6 abuts the shoulder 30 in the bore 8 of the lever 3. Thus the clutch including the parts 36 and 37 will be automatically disengaged.

During the following brake-releasing operation the lever 3 is turned in the direction opposite to the direction indicated by the arrow. The braking force will decrease and the rack 43 will be moved in such a direction relative to the lever 3 that the spring 45 will expand and cause rotation of the gear wheel 41 so that the rotary movement may be transmitted to the clutch sleeve 37. However, a transmission of such rotary movement to the shaft 7 is not possible before the braking force has decreased so much that the spring 35 has displaced the shaft 7 towards the left and a clutch connection has been established between the parts 36 and 37.

An adjustment of the slack—i.e. a turning of the worm 6—can be performed only if the clutch connection between the parts 36 and 37 has been established before the rack 43 has been fully returned, and in order to ensure that the slack between the brake shoes and the brake drum is kept constant—regardless of any stretching in the brake force transmitting elements—it is necessary that the spring 45 returns the gear wheel 41 during the period in which the clutch parts 36 and 37 are released from engagement with each other.

In view of Section 9 of the Patents Act, 1949 attention is directed to Patent No. (Application No. 8335/65) Serial No. 1,025,399.

WHAT WE CLAIM IS:—

1. An automatic slack adjuster for a vehicle brake linkage, of the kind referred to, characterised in that the said transmission system also includes a clutch which is automatically disengaged in response to braking forces exceeding a predetermined value.

2. An automatic slack adjuster according to claim 1, wherein the said worm is axially displaceable by the said worm wheel during transmission of braking force and a prestressed spring is mounted for resisting such displacement of the worm, the said clutch being engaged or disengaged consequent upon the axial movements of the worm.

3. An automatic slack adjuster according to Claim 1 or 2, wherein the said clutch includes conical clutch surfaces on a shaft carrying the worm and on a rotatable element included in the said one-way coupling.

4. An automatic slack adjuster according to claim 1, 2, or 3, wherein the one-way coupling comprises a helical spring arranged to engage internal cylindrical surfaces on two elements included in said clutch.

5. An automatic slack adjuster according to Claim 1, 2, 3, or 4, wherein the angular movement of the lever during braking and brake release is transmitted to one of the elements in the one-way coupling by engagement between a stationary member extending into the lever and a member rotatably mounted in said lever coaxially with the worm wheel, the said stationary member and the said member rotatably mounted in said lever being rotatably connected *via* a lost-motion connection.

6. An automatic slack adjuster for a vehicle brake linkage, constructed and arranged substantially as hereinbefore described with reference to and as shown in Figs. 1 and 2, or Figs. 3 and 4, or Figs. 5 and 6 and 7, of the accompanying drawings.

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3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

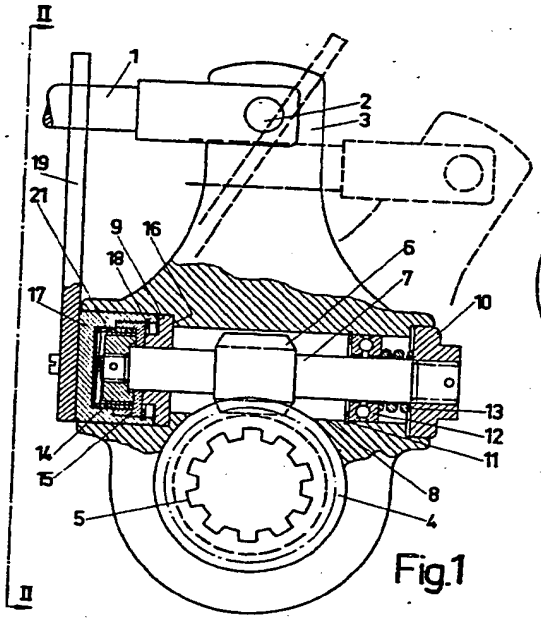

Fig.1

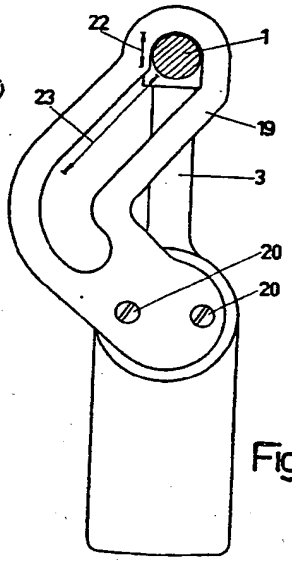

Fig.2

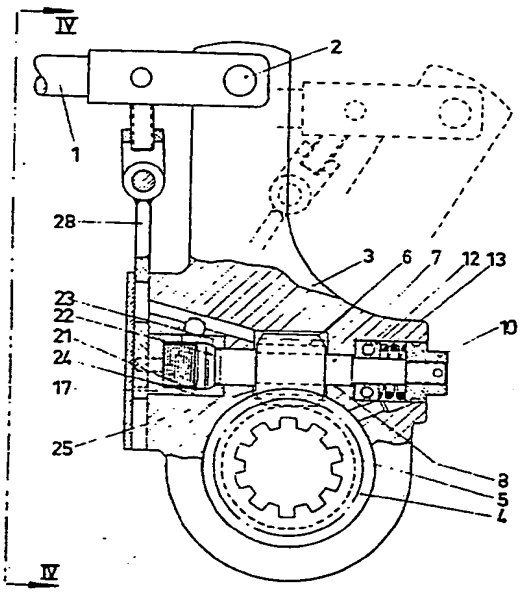

Fig.3

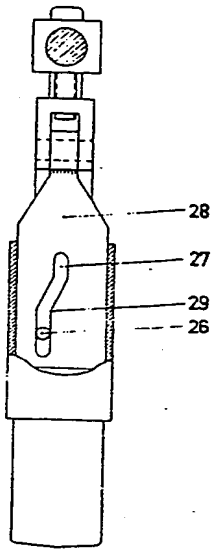

Fig.4

1025398 COMPLETE SPECIFICATION
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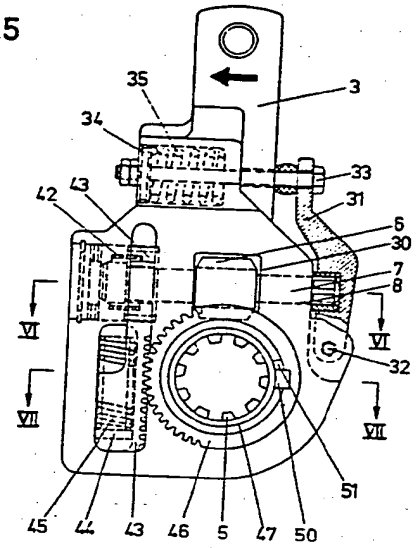
Sheets 2 & 3

Fig.5



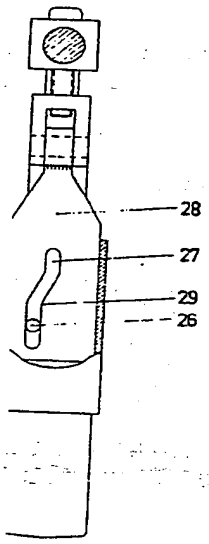


Fig.4

Fig. 6

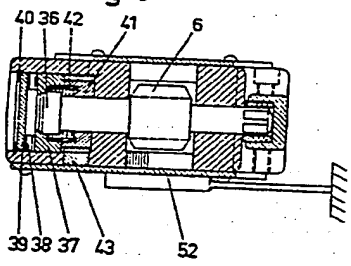
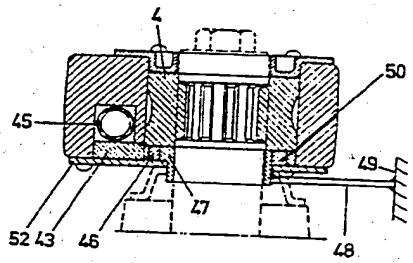


Fig.7



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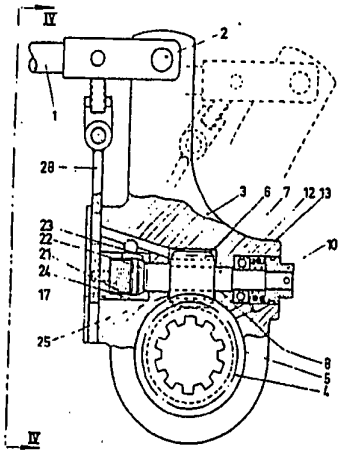

Fig.3

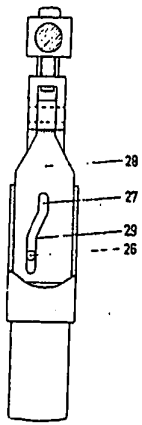

Fig.4

Fig.5

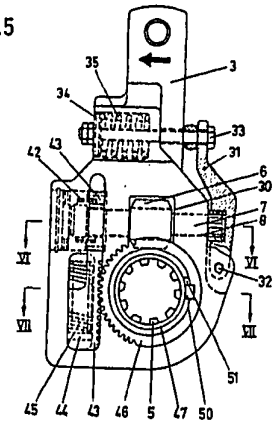

Fig.6

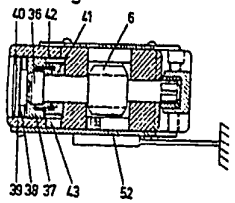

Fig.7